

CLAIMS

1. A vacuum hold-down device comprising a base member and a separate workpiece support which co-operate to define a vacuum chamber, and a venturi having an inlet port for connection to a source of pressurized fluid, an outlet for fluid from the venturi, and a fluid connection from a low pressure region of the venturi to the inside of the vacuum chamber, for providing a partial vacuum therein, which partial vacuum will hold the base member and the workpiece support together to maintain a peripheral seal therebetween; wherein the workpiece support is provided with securing means for securing a workpiece thereon.

2. A device according to claim 1, further including a bypass channel which connects a location between the inlet port and the low pressure region of the venturi to an air exhaust port for venting air to atmosphere, and a mechanism for automatically opening said channel in the event that vacuum in the vacuum chamber falls below a predetermined level.

3. A device according to claim 2, wherein said mechanism is arranged to automatically close said bypass channel when vacuum in the vacuum chamber rises above a predetermined level.

4. A device according to claim 2, wherein said mechanism comprises a blocking member movable between a blocking position in which it blocks the bypass channel and an unblocking position in which it does not block the bypass channel; said blocking member being urged by a spring force to the unblocking position when vacuum in the vacuum chamber

falls below a predetermined level.

5. A device according to claim 4, wherein the blocking member is connected to or integrally formed with a sealing member which provides a substantially fluid-tight seal between the bypass channel and the vacuum chamber, whereby when a sufficiently high vacuum is applied in the vacuum chamber the sealing member is urged by atmospheric pressure in a direction to move the blocking member from the unblocking position to the blocking position or to maintain the blocking member in the blocking position against the spring force.

6. A device according to claim 4 or claim 5, wherein when the blocking member is in the unblocking position part of it projects outside the base member to provide a visible indication that the vacuum level is insufficient.

7. A device according to any preceding claim, further including a source of pressurised fluid connected to the inlet port and provided with a pressure switch which will trigger a signal in the event that the fluid pressure drops below a predetermined value.

8. A device according to any preceding claim, wherein said fluid connection to the inside of the vacuum chamber is via a port in the base member.

9. A device according to any preceding claim, wherein the vacuum chamber is provided with at least one internal support that spans the distance between major internal surfaces of the base member and the workpiece support.

10. A device according to claim 9, wherein said at least one internal support comprises a plurality of elongate parallel upstands provided on the base member.

5 11. A device according to any preceding claim, wherein said securing means comprises at least one mechanical clamp for securing a workpiece.

10 12. A device according to any preceding claim, wherein said securing means comprises at least one hole in the workpiece support, providing fluid communication between the inside of the vacuum chamber and the work surface on top of the workpiece support to which a workpiece is to be secured.

15 13. A device according to any preceding claim, wherein at least one hole is provided in the base member, providing fluid communication between the inside of the vacuum chamber and an outside surface of the base member, to enable vacuum hold-down of the base member on a supporting surface.

20 14. A device according to any preceding claim, wherein the venturi is disposed substantially within the base member.

25 15. A device according to claim 1, wherein the base member is part of a machine table.

30 16. A vacuum hold-down system comprising a base member and a plurality of interchangeable workpiece supports, each of which workpiece supports is capable of co-operating with the base member to define a vacuum chamber, the base member being provided with a venturi having an inlet port for connection to a source of pressurized fluid, an outlet for fluid from the venturi, and a fluid connection from a low pressure

region of the venturi to a surface of the base member which will form part of the vacuum chamber, for providing a partial vacuum in the vacuum chamber, which partial vacuum when applied will hold the base member and the workpiece support together to maintain a peripheral seal therebetween; wherein each workpiece support is provided with securing means for securing at least one workpiece thereon.

17. A system according to any claim 16, wherein said securing means comprises at least one mechanical clamp for securing a workpiece.

18. A system according to claim 16 or claim 17, wherein each of said workpiece supports is of substantially identical construction.

19. A system according to claim 16 or claim 17, wherein at least some of said workpiece supports are of a different construction from each other.

20. A system according to any of claims 16-19, wherein the venturi is disposed substantially entirely within the area of the base member.

21. A system according to any of claims 16-20, wherein at least one hole is provided in the base member, providing fluid communication between the inside of the vacuum chamber and an outside surface of the base member, to enable vacuum hold-down of the base member on a supporting surface.

22. A system according to any of claims 16-21, further including a bypass channel which connects a location between the inlet port and the low pressure region of the venturi to

an air exhaust port for venting air to atmosphere, and a mechanism for automatically opening said channel in the event that vacuum in the vacuum chamber falls below a predetermined level.

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23. A system according to claim 22, wherein said mechanism comprises a blocking member movable between a blocking position in which it blocks the bypass channel and an unblocking position in which it does not block the bypass
10 channel; said blocking member being urged by spring means to the unblocking position when vacuum in the vacuum chamber falls below a predetermined level.

24. A system according to claim 23, wherein the blocking
15 member is connected to or integrally formed with a sealing member which provides a substantially fluid-tight seal between the bypass channel and the vacuum chamber, whereby when a sufficiently high vacuum is applied in the vacuum chamber the sealing member is urged by atmospheric pressure
20 in a direction to move the blocking member from the unblocking position to the blocking position or to maintain the blocking member in the blocking position against the spring force.

25 25. A system according to claim 23 or claim 24, wherein when the blocking member is in the unblocking position part of it projects outside the base member to provide a visible indication that the vacuum level is insufficient.

30 26. A system according to any of claims 16-25, further including a source of pressurised fluid connected to the inlet port and provided with a pressure switch which will trigger a signal in the event that the

fluid pressure drops below a predetermined value.